

CAT 2021**SHIFT-2****QUESTION
PAPER****Time Allowed : 2 Hours****Maximum Marks: 198****Important Instructions**

- (i) Total Number of Questions: 66
- (ii) Number of Question in Verbal Ability and Reading Comprehension (VARC): 24
- (iii) Number of Question in Data Interpretation and Logical Reasoning (DILR): 20
- (iv) Number of Question in Quantitative Ability (QA): 22
- (v) 40 Minutes are allotted to attempt each section.
- (vi) 4 answer options for each MCQ type question
- (vii) Answers are typed in the given space on the computer screen for Non-MCQ.
- (viii) For each correct answer: + 3 marks
- (ix) Negative marking (Applicable for wrong answers in MCQs): - 1 mark

Verbal Ability and Reading Comprehension (VARC)**Passage 1**

Directions (Q. 1 to 4): The passage below is accompanied by a set of questions. Choose the best answer to each question.
Many people believe that truth conveys power... Hence sticking with the truth is the best strategy for gaining power. Unfortunately, this is just a comforting myth. In fact, truth and power have a far more complicated relationship, because in human society, power means two very different things.

On the one hand, power means having the ability to manipulate objective realities: to hunt animals, to construct bridges, to cure diseases, to build atom bombs. This kind of power is closely tied to truth. If you believe a false physical theory, you won't be able to build an atom bomb. On the other hand, power also means having the ability to manipulate human beliefs, thereby getting lots of people to cooperate effectively. Building atom bombs requires not just a good understanding of physics, but also the coordinated labour of millions of humans. Planet Earth was conquered by Homo sapiens rather than by chimpanzees or elephants, because we are the only mammals that can cooperate in very large numbers. And large-scale cooperation depends on believing common stories. But these stories need not be true. You can unite millions of people by making them believe in completely fictional stories about God, about race or about economics. The dual nature of power and truth results in the curious fact that we humans know many more truths than any other animal, but we also believe in much more nonsense...

When it comes to uniting people around a common story, fiction actually enjoys three inherent advantages over the truth. First, whereas the truth is universal, fictions tend to be local. Consequently if we want to distinguish our tribe from foreigners, a fictional story will serve as a far better identity marker than a true story.... The second huge advantage of fiction over truth has to do with the handicap principle, which says that reliable signals must be costly to the signaler. Otherwise, they can easily be faked by cheaters.... If political loyalty is signaled by believing a true story, anyone can fake it. But believing ridiculous and outlandish stories exacts greater cost, and is therefore a better signal of loyalty Third, and most important, the truth is often painful and disturbing. Hence if you stick to unalloyed reality, few people will follow you. An American presidential candidate who tells the American public the truth, the whole truth and nothing but the truth about American history has a 100 percent guarantee of losing the elections.... An uncompromising adherence to the truth is an admirable spiritual practice, but it is not a winning political strategy....

Even if we need to pay some price for deactivating our rational faculties, the advantages of increased social cohesion are often so big that fictional stories routinely triumph over the truth in human history. Scholars

have known this for thousands of years, which is why scholars often had to decide whether they served the truth or social harmony. Should they aim to unite people by making sure everyone believes in the same fiction, or should they let people know the truth even at the price of disunity?

Q. 1. The central theme of the passage is about the choice between:

1. stories that unite people and those that distinguish groups from each other.
2. attaining social cohesion and propagating objective truth.
3. truth and power.
4. leaders who unknowingly spread fictions and those who intentionally do so.

Q. 2. The author implies that, like scholars, successful leaders:

1. use myths to attain the first type of power.
2. know how to balance truth and social unity.
3. need to leverage both types of power to remain in office.
4. today know how to create social cohesion better than in the past.

Q. 3. Regarding which one of the following quotes could we argue that the author over emphasises the importance of fiction?

1. "scholars often had to decide whether they served the truth or social harmony. Should they aim to unite people by making sure everyone believes in the same fiction, or should they let people know the truth?"

2. "In fact, truth and power have a far more complicated relationship, because in human society, power means two very different things."

3. "On the one hand, power means having the ability to manipulate objective realities: to hunt animals, to construct bridges, to cure diseases, to build atom bombs."

4. "Hence sticking with the truth is the best strategy for gaining power. Unfortunately, this is just a comforting myth."

Q. 4. The author would support none of the following statements about political power EXCEPT that:

1. manipulating people's beliefs is politically advantageous, but a leader who propagates only myths is likely to lose power.
2. there are definite advantages to promoting fiction, but there needs to be some limit to a pervasive belief in myths.
3. while unalloyed truth is not recommended, leaders should stay as close as possible to it.
4. people cannot handle the unvarnished truth, so leaders retain power by deviating from it.

Passage 2

Directions (Q. 5 to 8): The passage below is accompanied by a set of questions. Choose the best answer to each question.

I have elaborated a framework for analysing the contradictory pulls on [Indian] nationalist ideology in its struggle against the dominance of colonialism and the resolution it offered to those contradictions. Briefly, this resolution was built around a separation of the domain of culture into two spheres—the material and the spiritual. It was in the material sphere that the claims of Western civilization were the most powerful. Science, technology, rational forms of economic organization, modern methods of statecraft—these had given the European countries the strength to subjugate the non-European people.... To overcome this domination, the colonized people had to learn those superior techniques of organizing material life and incorporate them within their own cultures.... But this could not mean the imitation of the West in every aspect of life, for then the very distinction between the West and the East would vanish—the self-identity of national culture would itself be threatened....

The discourse of nationalism shows that the material/spiritual distinction was condensed into an analogous, but ideologically far more powerful, dichotomy: that between the outer and the inner applying the inner/outer distinction to the matter of concrete day-to-day living separates the social space into *ghar* and *bahir*, the home and the world. The world is the external, the domain of the material; the home represents one's inner spiritual self, one's true identity. The world is a treacherous terrain of the pursuit of material interests, where practical considerations reign supreme. It is also typically the domain of the male. The home in its essence

must remain unaffected by the profane activities of the material world—and woman is its representation. And so one gets an identification of social roles by gender to correspond with the separation of the social space into *ghar* and *bahir*.

The colonial situation, and the ideological response of nationalism to the critique of Indian tradition, introduced an entirely new substance to [these dichotomies] and effected their transformation. The material/spiritual dichotomy, to which the terms world and home corresponded, had acquired a very special significance in the nationalist mind. The world was where the European power had challenged the non-European peoples and, by virtue of its superior material culture, had subjugated them. But, the nationalists asserted, it had failed to colonize the inner, essential, identity of the East which lay in its distinctive, and superior, spiritual culture.... In the entire phase of the national struggle, the crucial need was to protect, preserve and strengthen the inner core of the national culture, its spiritual essence....

Once we match this new meaning of the home/world dichotomy with the identification of social roles by gender, we get the ideological framework within which nationalism answered the women's question. It would be a grave error to see in this, as liberals are apt to in their despair at the many marks of social conservatism in nationalist practice, a total rejection of the West. Quite the contrary: the nationalist paradigm in fact supplied an ideological principle of selection.

Q. 5. On the basis of the information in the passage, all of the following are true about the spiritual/material dichotomy of Indian nationalism EXCEPT that it:

1. helped in safeguarding the identity of Indian nationalism.
2. represented a continuation of age-old oppositions in Indian culture.
3. constituted the premise of the *ghar/bahir* dichotomy.
4. was not as ideologically powerful as the inner/outer dichotomy.

Q. 6. Which one of the following explains the "contradictory pulls" on Indian nationalism?

1. Despite its fight against colonial domination, Indian nationalism had to borrow from the coloniser in the spiritual sphere.
2. Despite its scientific and technological inferiority, Indian nationalism had to fight against colonial domination.
3. Despite its fight against colonial domination, Indian nationalism had to borrow from the coloniser in the material sphere.
4. Despite its spiritual superiority, Indian nationalism had to fight against colonial domination.

Q. 7. Which one of the following, if true, would weaken the author's claims in the passage?

1. The colonial period saw the hybridisation of Indian culture in all realms as it came in contact with British/European culture.
2. Forces of colonial modernity played an important role in shaping anti-colonial Indian nationalism.
3. Indian nationalists rejected the cause of English education for women during the colonial period.
4. The industrial revolution played a crucial role in shaping the economic prowess of Britain in the eighteenth century.

Q. 8. Which one of the following best describes the liberal perception of Indian nationalism?

1. Indian nationalist discourses reaffirmed traditional gender roles for Indian women.
2. Indian nationalism embraced the changes brought about by colonialism in Indian women's traditional gender roles.
3. Indian nationalist discourses provided an ideological principle of selection.
4. Indian nationalism's sophistication resided in its distinction of the material from the spiritual spheres.

Passage 3

Directions (Q. 9 to 12): The passage below is accompanied by a set of questions. Choose the best answer to each question.

It's easy to forget that most of the world's languages are still transmitted orally with no widely established written form. While speech communities are increasingly involved in projects to protect their languages – in print, on air and online – orality is fragile and contributes to linguistic vulnerability. But indigenous

languages are about much more than unusual words and intriguing grammar: They function as vehicles for the transmission of cultural traditions, environmental understandings and knowledge about medicinal plants, all at risk when elders die and livelihoods are disrupted.

Both push and pull factors lead to the decline of languages. Through war, famine and natural disasters, whole communities can be destroyed, taking their language with them to the grave, such as the indigenous populations of Tasmania who were wiped out by colonists. More commonly, speakers live on but abandon their language in favour of another vernacular, a widespread process that linguists refer to as "language shift" from which few languages are immune. Such trading up and out of a speech form occurs for complex political, cultural and economic reasons – sometimes voluntary for economic and educational reasons, although often amplified by state coercion or neglect. Welsh, long stigmatized and disparaged by the British state, has rebounded with vigor.

Many speakers of endangered, poorly documented languages have embraced new digital media with excitement. Speakers of previously exclusively oral tongues are turning to the web as a virtual space for languages to live on. Internet technology offers powerful ways for oral traditions and cultural practices to survive, even thrive, among increasingly mobile communities. I have watched as videos of traditional wedding ceremonies and songs are recorded on smartphones in London by Nepali migrants, then uploaded to YouTube and watched an hour later by relatives in remote Himalayan villages....

Globalization is regularly, and often uncritically, pilloried as a major threat to linguistic diversity. But in fact, globalization is as much process as it is ideology, certainly when it comes to language. The real forces behind cultural homogenization are unbending beliefs, exchanged through a globalized delivery system, reinforced by the historical monolingualism prevalent in much of the West.

Monolingualism – the condition of being able to speak only one language – is regularly accompanied by a deep-seated conviction in the value of that language over all others. Across the largest economies that make up the G8, being monolingual is still often the norm, with multilingualism appearing unusual and even somewhat exotic. The monolingual mindset stands in sharp contrast to the lived reality of most the world, which throughout its history has been more multilingual than unilingual. Monolingualism, then not globalization, should be our primary concern.

Multilingualism can help us live in a more connected and more interdependent world. By widening access to technology, globalization can support indigenous and scholarly communities engaged in documenting and protecting our shared linguistic heritage. For the last 5,000 years, the rise and fall of languages was intimately tied to the plow, sword and book. In our digital age, the keyboard, screen and web will play a decisive role in shaping the future linguistic diversity of our species.

Q. 9. The author lists all of the following as reasons for the decline or disappearance of a language EXCEPT:

1. governments promoting certain languages over others.
2. a catastrophic event that entirely eliminates a people and their culture.
3. people shifting away from their own language to study or work in another language.
4. the focus on only a few languages as a result of widespread internet use.

Q. 10. From the passage, we can infer that the author is in favour of:

1. cultural homogenisation.
2. "language shifts" across languages.

3. an expanded state role in the preservation of languages.

4. greater multilingualism.

Q. 11. We can infer all of the following about indigenous languages from the passage EXCEPT that:

1. they are repositories of traditional knowledge about the environment and culture.
2. people are increasingly working on documenting these languages.
3. they are in danger of being wiped out as most can only be transmitted orally.
4. their vocabulary and grammatical constructs have been challenging to document.

Q. 12. The author mentions the Welsh language to show that:

1. efforts to integrate Welsh speakers in the English-speaking fold have been fruitless.
2. languages can revive even after their

speakers have gone through a “language shift”.

3. vulnerable languages can rebound with state effort.
4. while often pilloried, globalisation can, in fact, support linguistic revival.

Passage 4

Directions (Q. 13 to 16): The passage below is accompanied by a set of questions. Choose the best answer to each question.

It has been said that knowledge, or the problem of knowledge, is the scandal of philosophy. The scandal is philosophy’s apparent inability to show how, when and why we can be sure that we know something or, indeed, that we know anything. Philosopher Michael Williams writes: ‘Is it possible to obtain knowledge at all? This problem is pressing because there are powerful arguments, some very ancient, for the conclusion that it is not . . . Scepticism is the skeleton in Western rationalism’s closet’. While it is not clear that the scandal matters to anyone but philosophers, philosophers point out that it should matter to everyone, at least given a certain conception of knowledge. For, they explain, unless we can ground our claims to knowledge as such, which is to say, distinguish it from mere opinion, superstition, fantasy, wishful thinking, ideology, illusion or delusion, then the actions we take on the basis of presumed knowledge – boarding an airplane, swallowing a pill, finding someone guilty of a crime – will be irrational and unjustifiable.

That is all quite serious-sounding but so also are the rattlings of the skeleton: that is, the sceptic’s contention that we cannot be sure that we know anything – at least not if we think of knowledge as something like having a correct mental representation of reality, and not if we think of reality as something like things-as-they-are-in-themselves, independent of our perceptions, ideas or descriptions. For, the sceptic will note, since reality, under that conception of it, is outside our ken (we cannot catch a glimpse of things-in-themselves around the corner of our own eyes; we cannot form an idea of reality that floats above the processes of our conceiving it), we have no way to compare our mental representations with things-as-they-are-in-themselves and therefore no way to determine whether they are correct or incorrect. Thus the sceptic may repeat (rattling loudly), you cannot be sure you ‘know’ something or anything at all – at least not, he may add (rattling softly before disappearing), if that is the way you conceive ‘knowledge’.

There are a number of ways to handle this situation. The most common is to ignore it. Most people outside the academy – and, indeed, most of us inside it – are unaware of or unperturbed by the philosophical scandal of knowledge and go about our lives without too many epistemic anxieties. We hold our beliefs and presumptive knowledge more or less confidently, usually depending on how we acquired them (I saw it with my own eyes; I heard it on Fox News; a guy at the office told me) and how broadly and strenuously they seem to be shared or endorsed by various relevant people: experts and authorities, friends and family members, colleagues and associates. And we examine our convictions more or less closely, explain them more or less extensively, and defend them more or less vigorously, usually depending on what seems to be at stake for ourselves and/or other people and what resources are available for reassuring ourselves or making our beliefs credible to others (look, it’s right here on the page; add up the figures yourself; I happen to be a heart specialist).

Q. 13. The author of the passage is most likely to support which one of the following statements?

1. For the sceptic, if we think of reality as independent of our perceptions, ideas or descriptions, we should aim to know that reality independently too.
2. The actions taken on the basis of presumed knowledge are rational and justifiable if

we are confident that that knowledge is widely held.

3. The confidence with which we maintain something to be true is usually independent of the source of the alleged truth.
4. The scandal of philosophy is that we might not know anything at all about reality if we think of reality as independent of our perceptions, ideas or descriptions.

Q. 14. According to the last paragraph of the passage, "We hold our beliefs and presumptive knowledges more or less confidently, usually depending on" something. Which one of the following most broadly captures what we depend on?

1. All of the options listed here.
2. How we come to hold them; how widely they are held in our social circles.
3. Remaining outside the academy; ignoring epistemic anxieties.
4. How much of a stake we have in them; what resources there are to support them.

Q. 15. ". . . we cannot catch a glimpse of things-in-themselves around the corner of our own eyes; we cannot form an idea of reality that floats above the processes of our conceiving it . . ." Which one of the following statements best reflects the argument being made in this sentence?

1. Our knowledge of reality floats above our subjective perception of it.
2. Our knowledge of reality cannot be merged with our process of conceiving it.
3. If the reality of things is independent of our eyesight, logically we cannot perceive our perception.
4. If the reality of things is independent of our perception, logically we cannot perceive that reality.

Q. 16. The author discusses all of the following arguments in the passage, EXCEPT:

1. philosophers maintain that the scandal of philosophy should be of concern to everyone.
2. sceptics believe that we can never fully know anything, if by "knowing" we mean knowledge of a reality that is independent of the knower.
3. if we cannot distinguish knowledge from opinion or delusion, we will not be able to justify our actions.
4. the best way to deal with scepticism about the veracity of knowledge is to ignore it.

Q. 17. The passage given below is followed by four alternate summaries. Choose the option that best captures the essence of the passage.

Biologists who publish their research directly to the Web have been labelled as "rogue", but

physicists have been routinely publishing research digitally ("preprints"), prior to submitting in a peer-reviewed journal. Advocates of preprints argue that quick and open dissemination of research speeds up scientific progress and allows for wider access to knowledge. But some journals still don't accept research previously published as a preprint. Even if the idea of preprints is gaining ground, one of the biggest barriers for biologists is how they would be viewed by members of their conservative research community.

1. One of the advantages of digital preprints of research is they hasten the dissemination process, but these are not accepted by most scientific communities.
2. While digital publication of research is gaining popularity in many scientific disciplines, almost all peer-reviewed journals are reluctant to accept papers that have been published before.
3. Compared to biologists, physicists are less conservative in their acceptance of digital pre-publication of research papers, which allows for faster dissemination of knowledge.
4. Preprints of research are frowned on by some scientific fields as they do not undergo a rigorous reviewing process but are accepted among biologists as a quick way to disseminate information.

Q. 18. Five jumbled up sentences, related to a topic, are given below. Four of them can be put together to form a coherent paragraph. Identify the odd one out and key in the number of the sentence as your answer:

1. It has taken on a warm, fuzzy glow in the advertising world, where its potential is being widely discussed, and it is being claimed as the undeniable wave of the future.
2. There is little enthusiasm for this in the scientific arena; for them marketing is not a science, and only a handful of studies have been published in scientific journals.
3. The new, growing field of neuro-marketing attempts to reveal the inner workings of consumer behaviour and is an extension of the study of how choices and decisions are made.

4. Some see neuromarketing as an attempt to make the "art" of advertising into a science, being used by marketing experts to back up their proposals with some form of real data.
5. The marketing gurus have already started drawing on psychology in developing tests and theories, and advertising people have borrowed the idea of the focus group from social scientists.

Q. 19. Five jumbled up sentences, related to a topic, are given below. Four of them can be put together to form a coherent paragraph. Identify the odd one out and key in the number of the sentence as your answer:

1. The care with which philosophers examine arguments for and against forms of biotechnology makes this an excellent primer on formulating and assessing moral arguments.
2. Although most people find at least some forms of genetic engineering disquieting, it is not easy to articulate why: what is wrong with re-engineering our nature?
3. Breakthroughs in genetics present us with the promise that we will soon be able to prevent a host of debilitating diseases, and the predicament that our newfound genetic knowledge may enable us to enhance our genetic traits.
4. To grapple with the ethics of enhancement, we need to confront questions that verge on theology, which is why modern philosophers and political theorists tend to shrink from them.
5. One argument is that the drive for human perfection through genetics is objectionable as it represents a bid for mastery that fails to appreciate the gifts of human powers and achievements.

Q. 20. The passage given below is followed by four alternate summaries. Choose the option that best captures the essence of the passage.

Creativity is now viewed as the engine of economic progress. Various organizations are devoted to its study and promotion; there are encyclopedias and handbooks surveying creativity research. But this proliferating success has tended to erode creativity's stable identity: it has become so invested with value that it has become impossible to police its

meaning and the practices that supposedly identify and encourage it. Many people and organizations committed to producing original thoughts now feel that undue obsession with the idea of creativity gets in the way of real creativity.

1. The obsession with original thought, how it can be promoted and researched, has made it impossible for people and organizations to define the concept anymore.
2. Creativity has proliferated to the extent that is no longer a stable process, and its mutating identity has stifled the creative process.
3. The value assigned to creativity today has assumed such proportions that the concept itself has lost its real meaning and this is hampering the engendering of real creativity.
4. The industry that has built up around researching what comprises and encourages creativity has destroyed the creative process itself.

Q. 21. The four sentences (labelled 1, 2, 3 and 4) below, when properly sequenced would yield a coherent paragraph. Decide on the proper sequencing of the order of the sentences and key in the sequence of the four numbers as your answer:

1. The US has long maintained that the Northwest Passage is an international strait through which its commercial and military vessels have the right to pass without seeking Canada's permission.
2. Canada, which officially acquired the group of islands forming the Northwest Passage in 1880, claims sovereignty over all the shipping routes through the Passage.
3. The dispute could be transitory, however, as scientists speculate that the entire Arctic Ocean will soon be ice-free in summer, so ship owners will not have to ask for permission to sail through any of the Northwest Passage routes.
4. The US and Canada have never legally settled the question of access through the Passage, but have an agreement whereby the US needs to seek Canada's consent for any transit.

Q. 22. The four sentences (labelled 1, 2, 3, 4) below, when properly sequenced would yield a coherent paragraph. Decide on the proper sequencing of the order of the sentences and key in the sequence of the four numbers as your answer:

1. But today there is an epochal challenge to rethink and reconstitute the vision and practice of development as a shared responsibility – a sharing which binds both the agent and the audience, the developed world and the developing, in a bond of shared destiny.
2. We are at a crossroads now in our vision and practice of development.
3. This calls for the cultivation of an appropriate ethical mode of being in our lives which enables us to realize this global and planetary situation of shared living and responsibility.
4. Half a century ago, development began as a hope for a better human possibility, but in the last fifty years, this hope has lost itself in the dreary desert of various kinds of hegemonic applications.

Q. 23. The passage given below is followed by four alternate summaries. Choose the option that best captures the essence of the passage.

The unlikely alliance of the incumbent industrialist and the distressed unemployed worker is especially powerful amid the debris of corporate bankruptcies and layoffs. In an economic downturn, the capitalist is more likely to focus on costs of the competition emanating from free markets than on the opportunities they create. And the unemployed worker will find many others in a similar condition and with anxieties similar to his, which will make it easier for them to organize together. Using the cover and the political organization provided by the distressed, the capitalist captures the political agenda.

1. An unlikely alliance of the industrialist and the unemployed happens during an

economic downturn in which they come together to unite politically and capture the political agenda.

2. An economic downturn creates competition because of which the capitalists capture the political agenda created by the political organisation provided by the unemployed.
3. In an economic downturn, the capitalists use the anxieties of the unemployed and their political organisation to set the political agenda to suit their economic interests.
4. The purpose of an unlikely alliance between the industrialist and the unemployed during an economic downturn is to stifle competition in free markets.

Q. 24. The four sentences (labelled 1, 2, 3 and 4) below, when properly sequenced would yield a coherent paragraph. Decide on the proper sequencing of the order of the sentences and key in the sequence of the four numbers as your answer:

1. Look forward a few decades to an invention which can end the energy crisis, change the global economy and curb climate change at a stroke: commercial fusion power.
2. To gain meaningful insights, logic has to be accompanied by asking probing questions of nature through controlled tests, precise observations and clever analysis.
3. The greatest of all inventions is the über-invention that has provided the insights on which others depend: the modern scientific method.
4. This invention is inconceivable without the scientific method; it will rest on the application of a diverse range of scientific insights, such as the process transforming hydrogen into helium to release huge amounts of energy.

Data Interpretation and Logical Reasoning (DILR)

Directions (Q. 1 to 6): Read the following passage and table carefully and answer the questions that follows:

Ten objects o₁, o₂, ..., o₁₀ were distributed among Amar, Barat, Charles, Disha, and Elise. Each item went to exactly one person. Each person got exactly two of the items, and this pair of objects is called her/his bundle. The following table shows how each person values each object.

	o1	o2	o3	o4	o5	o6	o7	o8	o9	o10
Amar	4	9	9	3	7	3	8	7	9	5
Barat	5	9	7	5	5	3	6	8	10	8
Charles	8	8	8	3	6	4	5	8	9	6
Disha	8	8	8	5	5	3	6	4	9	8
Elise	6	8	9	5	6	5	6	3	7	10

The value of any bundle by a person is the sum of that person's values of the objects in that bundle. A person X envies another person Y if X values Y's bundle more than X's own bundle.

For example, hypothetically suppose Amar's bundle consists of o₁ and o₂, and Barat's bundle consists of o₃ and o₄. Then Amar values his own bundle at $4 + 9 = 13$ and Barat's bundle at $9 + 3 = 12$. Hence Amar does not envy Barat. On the other hand, Barat values his own bundle at $7 + 5 = 12$ and Amar's bundle at $5 + 9 = 14$. Hence Barat envies Amar.

The following facts are known about the actual distribution of the objects among the five people.

1. If someone's value for an object is o₁₀, then she/he received that object.
2. Objects o₁, o₂, and o₃ were given to three different people.
3. Objects o₁ and o₈ were given to different people.
4. Three people value their own bundles at 16. No one values her/his own bundle at a number higher than 16.
5. Disha values her own bundle at an odd number. All others value their own bundles at an even number.
6. Some people who value their own bundles less than 16 envy some other people who value their own bundle at 16. No one else envies others.

Q. 1. What BEST can be said about object o₈?

1. o₈ was given to Amar, Charles, or Disha.
2. o₈ was given to Charles or Disha.
3. o₈ was given to Charles.
4. o₈ was given to Disha.

Q. 2. Who among the following envies someone else?

1. Amar
2. Charles
3. Elise
4. Barat

Q. 3. What is Amar's value for his own bundle?

Q. 4. Object o₄ was given to

1. Barat
2. Charles
3. Elise
4. Disha

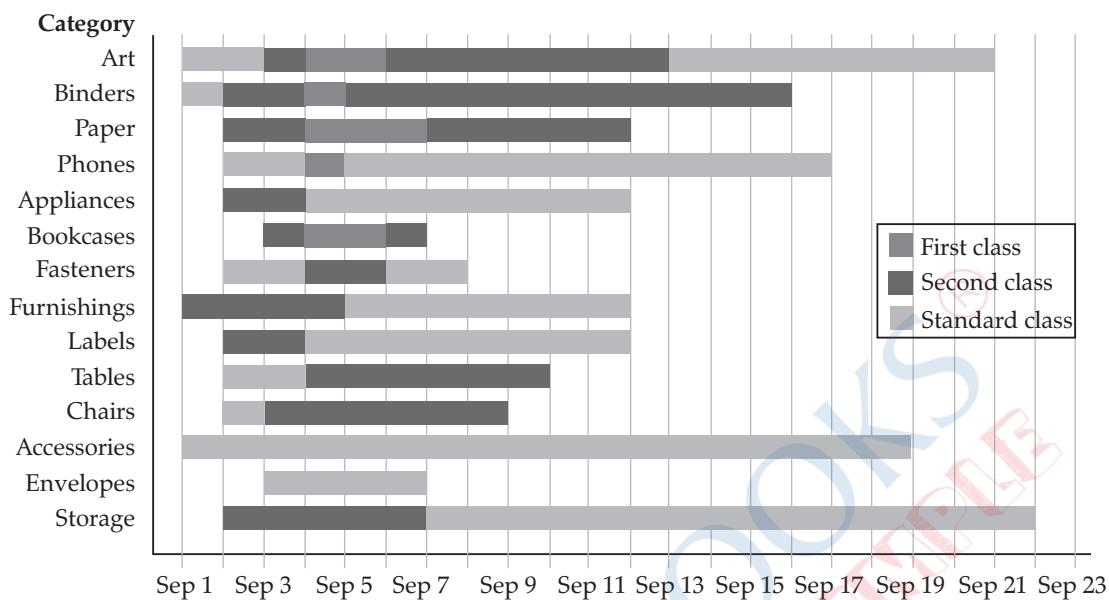
Q. 5. Object o₅ was given to

1. Disha
2. Elise
3. Charles
4. Amar

Q. 6. What BEST can be said about the distribution of object o₁?

1. o₁ was given to Charles or Disha.
2. o₁ was given to Charles, Disha, or Elise.
3. o₁ was given to Charles.
4. o₁ was given to Disha.

Directions (Q. 7 to 10): Read the following passage and bar chart carefully and answers the questions that follows:



The different bars in the diagram above provide information about different orders in various categories (Art, Binders, ...) that were booked in the first two weeks of September of a store for one client. The colour and pattern of a bar denotes the ship mode (First Class / Second Class / Standard Class). The left end point of a bar indicates the booking day of the order, while the right end point indicates the dispatch day of the order. The difference between the dispatch day and the booking day (measured in terms of the number of days) is called the processing time of the order. For the same category, an order is considered for booking only after the previous order of the same category is dispatched. No two consecutive orders of the same category had identical ship mode during this period.

For example, there were only two orders in the furnishing category during this period. The first one was shipped in the Second Class. It was booked on Sep 1 and dispatched on Sep 5. The second order was shipped in the Standard class. It was booked on Sep 5 (although the order might have been placed before that) and dispatched on Sep 12. So, the processing times were 4 and 7 days respectively for these orders.

- Q. 7. How many days between Sep 1 and Sep 14 (both inclusive) had no booking from this client considering all the above categories?
- Q. 8. What was the average processing time of all orders in the categories which had only one type of ship mode?
- Q. 9. The sequence of categories – Art, Binders, Paper and Phones – in decreasing order of average processing time of their orders in this period is:
1. Phones, Binders, Art, Paper
2. Phones, Art, Binders, Paper
3. Art, Binders, Paper, Phones
4. Paper, Binders, Art, Phones
- Q. 10. Approximately what percentage of orders had a processing time of one day during the period Sep 1 to Sep 22 (both dates inclusive)?
 1. 20%
 2. 22%
 3. 16%
 4. 25%

Directions (Q. 11 to 16): Read the following passage carefully and answer the questions that follows:

Ravi works in an online food-delivery company. After each delivery, customers rate Ravi on each of four parameters – Behaviour, Packaging, Hygiene and Timeliness, on a scale from 1 to 9. If the total of the four rating points is 25 or more, then Ravi gets a bonus of ₹20 for that delivery. Additionally, a customer may or may not give Ravi a tip. If the customer gives a tip, it is either ₹30 or ₹50.

One day, Ravi made four deliveries - one to each of Atal, Bihari, Chirag and Deepak, and received a total of ₹120 in bonus and tips. He did not get both a bonus and a tip from the same customer.

The following additional facts are also known.

1. In Timeliness, Ravi received a total of 21 points, and three of the customers gave him the same rating points in this parameter. Atal gave higher rating points than Bihari and Chirag in this parameter.
2. Ravi received distinct rating points in Packaging from the four customers adding up to 29 points. Similarly, Ravi received distinct rating points in Hygiene from the four customers adding up to 26 points.
3. Chirag gave the same rating points for Packaging and Hygiene.
4. Among the four customers, Bihari gave the highest rating points in Packaging, and Chirag gave the highest rating points in Hygiene.
5. Everyone rated Ravi between 5 and 7 in Behaviour. Unique maximum and minimum ratings in this parameter were given by Atal and Deepak respectively.
6. If the customers are ranked based on ratings given by them in individual parameters, then Atal's rank based on Packaging is the same as that based on Hygiene. This is also true for Deepak.

Q. 11. What was the minimum rating that Ravi received from any customer in any parameter?

2. ₹30

3. Either ₹0 or ₹30 or ₹50

4. ₹50

Q. 12. The COMPLETE list of customers who gave the maximum total rating points to Ravi is

Q. 15. In which parameter did Atal give the maximum rating points to Ravi?

1. Bihari and Chirag
2. Atal and Bihari
3. Bihari
4. Atal

1. Packaging

2. Hygiene

3. Timeliness

4. Behaviour

Q. 13. What rating did Atal give on Timeliness?

Q. 16. What rating did Deepak give on Packaging?

Q. 14. What BEST can be concluded about the tip amount given by Deepak?

1. 8

2. 5

1. Either ₹30 or ₹50

3. 6

4. 7

Directions (Q. 17 to 20): Read the following passage carefully and answer the questions that follows:

The game of Chango is a game where two people play against each other; one of them wins and the other loses, i.e., there are no drawn Chango games. 12 players participated in a Chango championship. They were divided into four groups: Group A consisted of Aruna, Azul, and Arif; Group B consisted of Brinda, Brij, and Biju; Group C consisted of Chitra, Chetan, and Chhavi; and Group D consisted of Dipen, Donna, and Deb. Players within each group had a distinct rank going into the championship. The players have NOT been listed necessarily according to their ranks. In the group stage of the game, the second and third ranked players play against each other, and the winner of that game plays against the first ranked player of the group. The winner of this second game is considered as the winner of the group and enters a semi-final. The winners from Groups A and B play against each other in one semi-final, while the winners from Groups C and D play against each other in the other semi-final. The winners of the two semi-finals play against each other in the final to decide the winner of the championship.

It is known that:

1. Chitra did not win the championship.
2. Aruna did not play against Arif. Brij did not play against Brinda.
3. Aruna, Biju, Chitra, and Dipen played three games each, Azul and Chetan played two games each, and the remaining players played one game each.

Q. 17. Who among the following was DEFINITELY NOT ranked first in his/her group?

Q. 19. Who won the championship?

1. Dipen
2. Aruna
3. Chitra
4. Brij

1. Chitra

2. Brij

3. Aruna

4. Cannot be determined

Q. 18. Which of the following pairs must have played against each other in the championship?

Q. 20. Who among the following did NOT play against Chitra in the championship?

1. Deb, Donna
2. Azul, Biju
3. Donna, Chetan
4. Chitra, Dipen

1. Aruna

2. Biju

3. Dipen

4. Chetan

Quantitative Aptitude (QA)

Q. 1. Consider the pair of equations:

$x^2 - xy - x = 22$ and $y^2 - xy + y = 34$. If $x > y$, then $x - y$ equals

- | | |
|------|------|
| 1. 7 | 2. 4 |
| 3. 6 | 4. 8 |

Q. 2. In a football tournament, a player has played a certain number of matches and 10 more matches are to be played. If he scores a total of one goal over the next 10 matches, his overall average will be 0.15 goals per match. On the other hand, if he scores a total of two goals over the next 10 matches, his overall average will be 0.2 goals per match. The number of matches he has played is

Q. 3. For all possible integers n satisfying $2.25 \leq 2 + 2^{n+2} \leq 202$, the number of integer values of $3 + 3^{n+1}$ is

Q. 4. Let D and E be points on sides AB and AC, respectively, of a triangle ABC, such that $AD : BD = 2 : 1$ and $AE : CE = 2 : 3$. If the area of the triangle ADE is 8 sq cm, then the area of the triangle ABC, in sq cm, is

Q. 5. A person buys tea of three different qualities at ₹800, ₹500, and ₹300 per kg, respectively, and the amounts bought are in the proportion $2 : 3 : 5$. She mixes all the tea and sells one-sixth of the mixture at ₹700 per kg. The price, in ₹ per kg, at which she should sell the remaining tea, to make an overall profit of 50%, is

- | | |
|--------|--------|
| 1. 688 | 2. 692 |
| 3. 653 | 4. 675 |

Q. 6. For all real values of x , the range of the

function $f(x) = \frac{x^2 + 2x + 4}{2x^2 + 4x + 9}$ is

- | | |
|--|--|
| 1. $\left[\frac{3}{7}, \frac{8}{9} \right)$ | 2. $\left(\frac{3}{7}, \frac{1}{2} \right)$ |
| 3. $\left[\frac{3}{7}, \frac{1}{2} \right)$ | 4. $\left[\frac{4}{9}, \frac{8}{9} \right]$ |

Q. 7. The number of ways of distributing 15 identical balloons, 6 identical pencils and 3 identical erasers among 3 children, such that each child gets at least four balloons and one pencil, is

Q. 8. Three positive integers x , y and z are in arithmetic progression. If $y - x > 2$ and $xyz = 5(x + y + z)$, then $z - x$ equals

- | | |
|-------|-------|
| 1. 8 | 2. 12 |
| 3. 10 | 4. 14 |

Q. 9. If $\log_2[3 + \log_3 \{4 + \log_4(x-1)\}] - 2 = 0$, then $4x$ equals

Q. 10. From a container filled with milk, 9 litres of milk are drawn and replaced with water. Next, from the same container, 9 litres are drawn and again replaced with water. If the volumes of milk and water in the container are now in the ratio of 16 : 9, then the capacity of the container, in litres, is

Q. 11. Raj invested ₹10000 in a fund. At the end of first year, he incurred a loss but his balance was more than ₹5000. This balance, when invested for another year, grew and the percentage of growth in the second year was five times the percentage of loss in the first year. If the gain of Raj from the initial investment over the two year period is 35%, then the percentage of loss in the first year is

- | | |
|-------|-------|
| 1. 10 | 2. 5 |
| 3. 70 | 4. 15 |

Q. 12. For a real number x the condition $|3x - 20| + |3x - 40| = 20$ necessarily holds if

- | | |
|------------------|-----------------|
| 1. $9 < x < 14$ | 2. $6 < x < 11$ |
| 3. $10 < x < 15$ | 4. $7 < x < 12$ |

Q. 13. Two pipes A and B are attached to an empty water tank. Pipe A fills the tank while pipe B drains it. If pipe A is opened at 2 pm and pipe B is opened at 3 pm, then the tank becomes full at 10 pm. Instead, if pipe A is opened at 2 pm and pipe B is opened at 4 pm, then the tank becomes full at 6 pm. If pipe B is not opened at all, then the time, in minutes, taken to fill the tank is

- | | |
|--------|--------|
| 1. 264 | 2. 140 |
| 3. 120 | 4. 144 |

Q. 14. The sides AB and CD of a trapezium ABCD are parallel, with AB being the smaller side. P is the midpoint of CD and ABPD is a parallelogram. If the difference between the areas of the

parallelogram ABPD and the triangle BPC is 10 sq cm, then the area, in sq cm, of the trapezium ABCD is

- | | |
|-------|-------|
| 1. 40 | 2. 30 |
| 3. 25 | 4. 20 |

Q. 15. Two trains A and B were moving in opposite directions, their speeds being in the ratio 5 : 3. The front end of A crossed the rear end of B 46 seconds after the front ends of the trains had crossed each other. It took another 69 seconds for the rear ends of the trains to cross each other. The ratio of length of train A to that of train B is

- | | |
|----------|----------|
| 1. 2 : 3 | 2. 5 : 3 |
| 3. 2 : 1 | 4. 3 : 2 |

Q. 16. A box has 450 balls, each either white or black, there being as many metallic white balls as metallic black balls. If 40% of the white balls and 50% of the black balls are metallic, then the number of non-metallic balls in the box is

Q. 17. If a rhombus has area 12 sq cm and side length 5 cm, then the length, in cm, of its longer diagonal is

- | | |
|--------------------------------------|----------------------------|
| 1. $\frac{\sqrt{37} + \sqrt{13}}{2}$ | 2. $\sqrt{37} + \sqrt{13}$ |
| 3. $\frac{\sqrt{13} + \sqrt{12}}{2}$ | 4. $\sqrt{13} + \sqrt{12}$ |

Q. 18. For a 4-digit number, the sum of its digits in the thousands, hundreds and tens places is 14, the sum of its digits in the hundreds, tens and units places is 15, and the tens place digit is 4 more than the units place digit. Then the

highest possible 4-digit number satisfying the above conditions is

Q. 19. For a sequence of real numbers x_1, x_2, \dots, x_n , if $x_1 - x_2 + x_3 - \dots + (-1)^{n+1} x_n = n^2 + 2n$ for all natural numbers n , then the sum $x_{49} + x_{50}$ equals

- | | |
|---------|--------|
| 1. -2 | 2. 2 |
| 3. -200 | 4. 200 |

Q. 20. Anil can paint a house in 60 days while Bimal can paint it in 84 days. Anil starts painting and after 10 days, Bimal and Charu join him. Together, they complete the painting in 14 more days. If they are paid a total of ₹21000 for the job, then the share of Charu, in ₹, proportionate to the work done by him, is

- | | |
|---------|---------|
| 1. 9100 | 2. 9150 |
| 3. 9000 | 4. 9200 |

Q. 21. Anil, Bobby and Chintu jointly invest in a business and agree to share the overall profit in proportion to their investments. Anil's share of investment is 70%. His share of profit decreases by ₹420 if the overall profit goes down from 18% to 15%. Chintu's share of profit increases by ₹80 if the overall profit goes up from 15% to 17%. The amount, in ₹, invested by Bobby is

- | | |
|---------|---------|
| 1. 2200 | 2. 2400 |
| 3. 1800 | 4. 2000 |

Q. 22. Suppose one of the roots of the equation $ax^2 - bx + c = 0$ is $2 + \sqrt{3}$, where a, b and c are rational numbers and $a \neq 0$. If $b = c^3$, then $|a|$ equals

- | | |
|------|------|
| 1. 3 | 2. 1 |
| 3. 4 | 4. 2 |

Answer Key

Verbal Ability and Reading Comprehension (VARC)

1. (2)	2. (2)	3. (1)	4. (4)	5. (2)	6. (3)	7. (1)	8. (1)	9. (4)	10. (4)
11. (4)	12. (2)	13. (4)	14. (2)	15. (4)	16. (4)	17. (3)	18. (5)	19. (1)	20. (3)
21. 2143	22. 2413	23. (3)	24. 3214						

Data Interpretation and Logical Reasoning (DILR)

1. (3)	2. (1)	3. 12	4. (4)	5. (2)	6. (4)	7. 6	8. 11	9. (2)	10. (1)
11. 5	12. (1)	13. 6	14. (1)	15. (4)	16. (4)	17. (1)	18. (4)	19. (3)	20. (2)

Quantitative Aptitude (QA)

1. (4)	2. 10	3. 7	4. 30	5. (1)	6. (3)	7. 1000	8. (4)	9. 5	10. 45
11. (1)	12. (4)	13. (4)	14. (2)	15. (4)	16. 250	17. (2)	18. 4195	19. (1)	20. (1)
21. (4)	22. (4)								

Answers and Explanations

Verbal Ability and Reading Comprehension (VARC)

1. Option (2) is correct.

The passage on the whole is questioning the power of truth. The writer clarifies that truth is definitely a good 'spiritual practice', but often results in disuniting people. Whereas power and fiction mean 'having the ability to manipulate human beliefs' which lead to social cohesion and effective results. This theme is reiterated in the concluding paragraph that given the advantages of increased social cohesion, fictional stories routinely triumph over the truth in human history. The dilemma is often found among scholars- 'Should they aim to unite people by making sure everyone believes in the same fiction, or should they let people know the truth even at the price of disunity?' (1) is not elaborated; (3) is vague, because scholars are found to be in two minds regarding the aim of attaining social cohesion or propagating objective truth. (4) is not illustrated.

Therefore, the central theme of the passage is about the choice between attaining social cohesion and propagating objective truth.

2. Option (2) is correct.

It is stated in the passage that prominent leaders will not secure public votes if they opt for truth over fiction. Therefore, 'an uncompromising adherence to the truth is an admirable spiritual practice, but it is not a winning political strategy.' This will be seconded by the scholars, who infer that 'even if we need to pay some price for deactivating our rational faculties, the advantages of increased social cohesion are often so big that fictional stories routinely triumph over the truth in human history.' This justifies the need to balance truth and social unity to become successful leaders. Other

options cannot be corroborated from the beliefs of the scholars.

Therefore, the author implies that, like scholars, successful leaders know how to balance truth and social unity.

3. Option (1) is correct.

(1) rightly illustrates the advantages of fiction of uniting people through closed cooperation, which truth hardly permits. This is evinced in the dilemma of the scholars, who, despite knowing the appropriateness of practicing truth, stress on the role of fiction in manipulating human beliefs, 'thereby getting lots of people to cooperate effectively.' This clearly exhibits the importance of fiction. (2) cannot be justified to be overemphasising the importance of fiction. (3) and (4) fail to capture the importance of fiction.

4. Option (4) is correct.

The writer claims in the third paragraph that 'if you stick to unalloyed reality, few people will follow you.' This is elaborated in the example of an American presidential candidate, who prefers truth over fiction, consequently he loses the elections. This affirms that people are unable to take in 'unalloyed truth', and is definitely 'not a winning political strategy.' Therefore, it is advisable to keep away from it. (1) is a distorted information, not stated in the passage; (2) is correct in the first clause, but the second clause cannot be corroborated from the passage; (3) is contradicting the author's recommendation.

Therefore, the author would definitely support that people cannot handle the unvarnished truth, so leaders retain power by deviating from it.

5. Option (2) is correct.

It is apparent that the spiritual/material dichotomy of Indian nationalism comprised the ideological response of nationalism to the critique of Indian tradition and it 'had a very special significance in the nationalist mind. Thus, the spiritual/material dichotomy helped in safeguarding the identity of Indian nationalism. (3) is correct because the discourse of nationalism shows that the material/spiritual distinction was condensed into a dichotomy: that between the outer and the inner. This distinction to the matter of concrete day-to-day living separates the social space into *ghar* and *bahir*, the home and the world. As understood from the second paragraph, the material/spiritual distinction was condensed into a dichotomy, which was subjugated by a far more ideologically powerful distinction: the inner/outer dichotomy. (2) is nowhere implied in the passage.

6. Option (3) is correct.

The first paragraph indicates that the nationalist ideology was pitted against the dominance of colonialism, which was largely in the material sphere, and to overcome 'this domination, the colonized people had to learn those superior techniques of organizing material life and incorporate them within their own cultures', but this imitation would connote the loss of identity for the colonized. This struggle is best reflected in (3). (4) is inappropriate as there is no reference to spiritual superiority. (1) is incorrect as the borrowing was done in the material sphere, not the spiritual. (2) fails to justify the struggle- if Indian nationalism is inferior in scientific and technological inferiority, it cannot fight the superiority of the colonial domination.

7. Option (1) is correct.

It is to be noted that the writer of the passage claims in the first paragraph that 'the colonized people had to learn those superior techniques of organizing material life and incorporate them within their own cultures'; therefore, if it is claimed that the colonial period saw the hybridisation of Indian culture in all realms

as it came in contact with British/European culture, it automatically impacts the argument of borrowing only from the material sphere. (3) does not serve to weaken the argument made in the passage , because it is against the 'mean the imitation of the West in every aspect of life'. (2) supports the cause of anti-colonial Indian nationalism. (4) is not related and immaterial to the argument.

Therefore, the argument that the colonial period saw the hybridisation of Indian culture in all realms as it came in contact with British/ European culture would weaken the author's claims in the passage.

8. Option (1) is correct.

The reference to the liberals and their perception is in the last paragraph-'liberals are apt to in their despair at the many marks of social conservatism in nationalist practice, a total rejection of the West.' To say, the liberals observed social conservatism in nationalist practice. The option should contain a perception pertaining to the 'social conservatism', which is only attained in (1). Hence, other options are negated for not supporting the stand.

9. Option (4) is correct.

The writer clearly advocates the role of internet technology for the thriving of oral traditions and cultural practices. The focus on only a few languages as a result of widespread internet use promotes multilingualism, instead of monolingualism, which is a welcome move for languages to survive. If governments promote certain languages over others, it would end up being promoting monolingualism, which is the primary threat to the depletion of languages. (2) risks the extinction of people and their indigenous culture. (3) is also listed as a concern when the writer states that 'language shift' may be a result of educational reasons.

Therefore, the focus on only a few languages as a result of widespread internet use is not a reason for the decline or disappearance of a language.

10. Option (4) is correct.

The writer explicitly states in the final paragraph that 'multilingualism can help

us live in a more connected and more interdependent world.' The writer is in favour of any prospect of salvaging indigenous languages. (1) is incorrect because cultural homogenisation can be attained through globalization; (2) is contradicting the writer's fundamental objective of redeeming the decline of languages. (3) is unconvincing and cannot be inferred from the passage.

Therefore, the author is in favour of greater multilingualism.

11. Option (4) is correct.

The writer unequivocally states in the first paragraph that indigenous languages 'are about much more than unusual words and intriguing grammar'; they are 'vehicles for the transmission of cultural traditions, environmental understandings and knowledge about medicinal plants'. This affirms that indigenous languages are repositories of traditional knowledge about the environment and culture. The fact that 'speech communities are increasingly involved in projects to protect their languages' evince the authenticity of (2). (3) is confirmed in 'orality is fragile and contributes to linguistic vulnerability.' (4) is nowhere stated or implied.

Therefore, the assertion that vocabulary and grammatical constructs of indigenous languages have been challenging to document is incorrect.

12. Option (2) is correct.

The writer refers to the Welsh in the second paragraph when elucidating the fact that few languages are from the "language shift". As seen in the case of Welsh, which has been 'long stigmatized and disparaged by the British state, but rebounded with vigour', thus revealing that even though Welsh was denounced and pilloried, it revived itself despite undergoing a "language shift". Other options do not reflect this example of language shift.

Therefore, the author mentions the Welsh language to show that languages can revive even after their speakers have gone through a "language shift".

13. Option (4) is correct.

The writer states in the affirmative that the scandal is philosophy's apparent inability to show how, when and why we can be sure that we know something. This is reverberated in the sceptic's contention, which holds 'that we cannot be sure that we know anything – at least not if we think of knowledge as something like having a correct mental representation of reality, and not if we think of reality as something like things-as-they-are-in-themselves, independent of our perceptions, ideas or descriptions.' (1) is incorrect, because as per the sceptic's argument, one cannot claim to know anything, especially if one thinks of reality as independent of our perceptions, ideas or descriptions. (2) is unwarranted, as the writer never justifies actions taken on the basis of presumed knowledge, when one is confident of the widely held knowledge. (3) is contrary, since the confidence that something we know is true stems from the alleged source of 'truth'.

Therefore, the author will definitely support the statement that the scandal of philosophy is that we might not know anything at all about reality if we think of reality as independent of our perceptions, ideas or descriptions.

14. Option (2) is correct.

The last paragraph asserts that we tend to hold on to our 'presumptive knowledge more or less confidently' based on the endorsements by experts and authorities and ratifications from people in the social circle (friends and family members, colleagues and associates). The beliefs are often the result of what we see or hear of them in our day to day lives. (3) is incorrect because by ignoring epistemic anxieties, we do not hold our beliefs and presumptive knowledge more or less confidently. (4) is incorrect because the resources available to support our beliefs cannot be inferred from the passage.

Therefore, the beliefs and presumptive knowledge usually depend on how we come to hold them and how widely they are held in our social circles.

15. Option (4) is correct.

The writer reveals the argument of the sceptics in the second paragraph that we cannot be sure that we know anything if we think of reality as independent of our perceptions, ideas or descriptions. This is so because, according to the sceptics, reality being outside the cognizance of humans, there is 'no way to compare our mental representations with things-as-they-are-in-themselves and therefore no way to determine whether they are correct or incorrect.' (1) cannot be justified; (2) does not justify the context in which the mentioned excerpt is used. (3) cannot be related and the aspect of logically perceiving our perception is unexplained in the passage.

Therefore, the statement "... we cannot catch a glimpse of things-in-themselves around the corner of our own eyes; we cannot form an idea of reality that floats above the processes of our conceiving it ..." reflects that if the reality of things is independent of our perception, logically we cannot perceive that reality.

16. Option (4) is correct.

The argument that philosophers maintain that the scandal of philosophy should be of concern to everyone is elucidated in the first paragraph – 'it is not clear that the scandal matters to anyone but philosophers, philosophers point out that it should matter to everyone, at least given a certain conception of knowledge.' (2) is illustrated in the second paragraph with the mention of the sceptics' contention that one cannot know everything, if it is considered independent of the knower's perceptions, ideas or descriptions. (3) is explicitly stated in the first paragraph – ', unless we can ground our claims to knowledge as such, which is to say, distinguish it from mere opinion, superstition, fantasy, wishful thinking, ideology, illusion or delusion, then the actions we take on the basis of presumed knowledge – boarding an airplane, swallowing a pill, finding someone guilty of a crime – will be irrational and unjustifiable.' Thus, if we cannot distinguish knowledge from opinion or delusion, we will not be able to justify our actions. Whereas, the writer never claims that the best way to deal with scepticism

about the veracity of knowledge is to ignore it. In fact, he states that one of the 'common ways' to deal with scepticism about the veracity of knowledge is to ignore it.

Therefore, the statement that the best way to deal with scepticism about the veracity of knowledge is to ignore it is inappropriate.

17. Option (3) is correct.

The passage establishes the contradictory attitudes towards biologists who publish their research directly to the web and the physicists who indulge in the same pre-printing. This is more pronounced because of the conservative research community of the biologists. But it has been observed that open dissemination of research speeds up scientific progress and allows for wider access to knowledge. This is best expressed in (3). (4) offers an extreme conclusion – preprints of research are frowned on by some scientific fields as they do not undergo a rigorous reviewing process, which is not true. (2) focuses on the popularity of digital publication of research, instead of the highlighting the advantages of the same. (1) is too restricted and fails to diversify to the stand of biologists and physicists.

18. Option (5) is correct.

(3) starts with the growing field of neuro-marketing. It has made its impact in the advertising world, like its attempt to make the "art" of advertising into a science, which is being used by marketing experts to back up their proposals with some form of real data. But this is not an attractive in the proposal arena because marketing is not a science. (5) concentrates on psychology in developing tests and theories, and social which does not relate to advertising, thus, it is the odd one out.

19. Option (1) is correct.

All the sentences, except (1) is about genetic engineering. (3) introduces the topic–genetics and genetic engineering. (2), (5), (4) are related to the reasons behind the disquieting nature of genetic engineering. While (1) is completely off the topic, it relates to arguments against forms of biotechnology which makes it the odd one out.

20. Option (3) is correct.

The paragraph unfolds the negative effects of creativity – the success of creativity has tended to erode creativity's stable identity, especially due to the value attached to creativity. This results in the essence of creativity getting lost in the obsession with the idea of creativity. This is best expressed in (3) – the value assigned to creativity today has assumed such proportions that the concept itself has lost its real meaning and this is hampering the engendering of real creativity. (1) indulges in an immaterial thought – the impossibility for people and organizations to define the concept of 'original thought' anymore. (4) comes to the conclusion of pinning the loss of creativity on the 'industry that has built up around researching', this is unwarranted. (2) is a red herring, in stating that creativity is no longer a stable process, but it is mentioned that the 'proliferating success has tended to erode creativity's stable identity'.

21. Correct answer is [2143].

(2) introduces the topic – Canada claiming sovereignty over all the shipping routes through the Northwest Passage. (1) shows the picture on the other side: the version of the US, that is, the Northwest Passage is an international strait through which its commercial and military vessels have the right to pass without seeking Canada's permission. This brings about the dispute between the US and Canada, in respect to the question of access through the Passage. But they seemed to have finally reached a concurrence whereby the US needs to seek Canada's consent for any transit as given in (4). (3) follows next, by mentioning the fleeting dispute between the nations, resolving that ship owners will not have to ask for permission to sail through any of the Northwest Passage routes.

22. Correct answer is [2413]

(2) indicates the plot – we are at crossroads now in our vision and practice of development. This is illustrated in (4) – development began earlier, but the last fifty years, this hope has lost itself. (1) refers to the recent times, when there lies the challenge of reconstructing the practice of development as a shared responsibility. But to realize this situation of shared living and responsibility, (3) we require the cultivation of an appropriate ethical mode of being in our lives.

23. Option (3) is correct.

The passage demonstrates the alliance of the industrialist and the unemployed in an economic downturn. Hereby, the capitalist is more likely to focus on costs of the competition emanating from free markets, and use the anxieties of the unemployed and their political organisation to capture the political agenda. This is concisely expressed in (3). (4) incorrectly over-stretches the purpose of unlikely alliance between the industrialist and the unemployed. (1) is a misinformation, which involves in portraying the unlikely alliance between the industrialist and the unemployed as a pre-planned ploy to unite politically and capture the political agenda. (2) is an incorrect information – economic downturn creates competition, which allows the capitalists to capture the political agenda.

24. Correct answer is [3214]

(3) introduces the subject – the über-invention, which provides insights on the modern scientific method. While (2) continues the thought claiming, that to gain meaningful insights, logic has to be accompanied by asking probing questions of nature through controlled tests, like 'commercial fusion power'. Thus, 3-2-1 is a logical chain. While (4) follows (1), by stating 'this invention is inconceivable', referring to 'commercial fusion power'.

Data Interpretation and Logical Reasoning (DILR)

Solution for Questions 1 to 6:

Envies = Giving more value to other than its own bundle.

If someone's value for an object is 10, then she/he receives the object it means o9 belongs to Barat & o10 belongs to Elise.

Putting odd in Disha's row & even in others'. (Given)

	o1	o2	o3	o4	o5	o6	o7	o8	o9	o10	Sum
Amar									✗	✗	Even
Barat									✓	✗	Even
Charles									✗	✗	Even
Disha									✗	✗	Odd
Elise									✗	✓	Even

Barat's bundle has even value & out of which one object has value 10.

So, the conditions for value of other object of Barat is that it must be an even number less than or equal to 6. (As the maximum sum of the values in own bundle can be maximum 16.)

As per the above condition all values are ruled out except 6. So, it must have the value of 16 in bundle.

Conditions for Barat & Elise are similar; So, Elise also must have bundle's value 16.

	o1	o2	o3	o4	o5	o6	o7	o8	o9	o10	Sum
Amar							✗		✗	✗	Even
Barat	✗	✗	✗	✗	✗	✗	✓	✗	✓	✗	Even (16)
Charles							✗		✗	✗	Even
Disha							✗		✗	✗	Odd
Elise		✗	✗	✗		✗	✗	✗	✗	✓	Even (16)

We know that there would be 3 people having value of 16 in their bundle. So this third person with value 16 can be either Amar or the Charles.

By taking hit and trial we will check values of Barat's value in Amar's bundle. It would be $8 + 9 = 17$. We know that Amar's values in his own bundle cannot be more than 16. From this, it can be deduced that Amar envies Barat & as per 6th statement in the question value of Amar's object in his bundle must be less than 16.

If Amar's value is less than 16, then the third person with value 16 in his/her own bundle will be Charles.

For Charles the values possible to make 16 can only be from 8 & 8.

Out of o1, o2, o3 Charles can take any one 8 because all o1, o2, o3 goes to different people.

So, another value of 8 for Charles can only be o8.

	o1	o2	o3	o4	o5	o6	o7	o8	o9	o10	Sum
Amar							✗	✗	✗	✗	Even
Barat	✗	✗	✗	✗	✗	✗	✓	✗	✓	✗	Even (16)
Charles				✗	✗	✗	✗	✓	✗	✗	Even (16)
Disha							✗	✗	✗	✗	Odd
Elise		✗	✗	✗		✗	✗	✗	✗	✓	Even (16)

o1 & o8 goes to different people so it o1 cannot be of Charles.

We know Amar has even value less than 16 & to make even sum out of two numbers, two numbers would be either both odd or both even. From left values for Amar there is only one even number which can't help in making even sum. So, Amar cannot have o1.

	o1	o2	o3	o4	o5	o6	o7	o8	o9	o10	Sum
Amar	×						×	×	×	×	Even (10/12)
Barat	×	×	×	×	×	×	✓	×	✓	×	Even (16)
Charles	×			×	×	×	×	✓	×	×	Even (16)
Disha							×	×	×	×	Odd (13/11)
Elise		×	×	×		×	×	×	×	✓	Even (16)

From here multiple possibilities are taking place, In these kind of situation go through the question based on data. By eliminating some options we can get some concrete point about anyone.

Information from questions 4 and 6 can be used to answer question 3 and 5 as both of them could not be answered directly using the table.

o1 and o4 was given to Disha.

	o1	o2	o3	o4	o5	o6	o7	o8	o9	o10	Sum
Amar	×			×	×		×	×	×	×	Even (12)
Barat	×	×	×	×	×	×	✓	×	✓	×	Even (16)
Charles	×			×	×	×	×	✓	×	×	Even (16)
Disha	✓	×	X	✓	×	×	×	×	×	×	Odd (13)
Elise	×	×	X	×	✓	×	×	×	×	✓	Even (16)

1. Option (3) is correct.

As per the data given the table,

By looking at the above table, it clear that o8 was given to Charles,

2. Option (1) is correct.

As per the data given the table,

Amar envies someone else has been proved in the above explanation.

3. Correct answer is [12].

As per the data given the table,

Amar's value for his own bundle = 12

4. Option (4) is correct.

As per the data given the table,

From the given options 3 are eliminated by looking at the table.

Hence, o4 was given to Disha.

5. Option (2) is correct.

As per the data given the table,

o5 was given to Elise.

6. Option (4) is correct.

As per the data given the table,

About o1, out of 4 options three have mentioned Charles but table says Charles cannot get o1. Hence o1 was given to Disha.

Solution for Questions 7 to 10:

7. Correct answer is [6].

As per the data given in the bar graph,

Days where no booking is taking place = Sep 8, Sep 9, Sep 10, Sep 11, Sep 12, Sep 14

So, number of days between Sep 1 to Sep 14 (both inclusive) when there is no booking = 6

8. Correct answer is [11].

As per the data given in the bar graph,

Categories having only one type of ship mode are accessories & envelops.

Processing time of accessories & envelops are 18 days and 4 days respectively.

So, their average = $22/2 = 11$

9. Option (2) is correct.

As per the data given in the bar graph,

Average processing time taken for Art = $20/5 = 4$

Average processing time taken for Binders = $15/4 = 3.75$

Average processing time taken for Paper = $10/3$
 $= 3.33$

Average processing time taken for Phone = $15/3$
 $= 5$

After arranging in decreasing order the sequence would be Phones, Art, Binders, Paper.

10. Option (1) is correct.

As per the data given in the bar graph,

Total number of orders = 35

Orders having processing of one day = 7

Required percentage = $100 \times 7/35 = 20\%$

Solution for Questions 11 to 16:

In Timeliness 3 people gave same rating & Atal gave higher than Bihari and Chirag in this parameter, which means out of four people Atal gave the highest rating and other 3 people gave same rating.

Above mentioned condition can take place in two ways 9, 4, 4, 4 or 6, 5, 5, 5.

	Behaviour	Packaging	Hygiene	Timeliness	Sum	Tip/Bonus
Atal	7	M	S	9/6		
Bihari	6	N (Highest)	R	4/5		
Chirag	6	O	O (Highest)	4/5		
Deepak	5	P	Q	4/5		
Total	24	29	26	21		

In Packaging all gave distinct rating which adds up to 29. The only possible group of numbers is 9, 8, 7, 5 in Packaging Bihari gave the highest rating which means rating 9 is given by Bihari.

In Packaging Chirag must have given out of 8, 7 & 5.

Chirag gave same rating Packaging and Hygiene but his rating in Hygiene is the highest.

So, the highest rating in Hygiene would be out of 8, 7 & 5.

With given condition only possible group of four distinct numbers is 8, 7, 6, 5. Out of which 8 belongs to Chirag as he gave the highest rating.

Atal's Rank in Packaging = Atal's Rank in Hygiene = either 3rd or 4th

Deepak's Rank in Packaging = Deepak's Rank in Hygiene = either 3rd or 4th

From these it can be concluded that in Hygiene the 2nd highest rating (7) was given by Bihari.

	Behaviour	Packaging	Hygiene	Timeliness	Sum	Tip/ Bonus
Atal	7	7/5	6/5	9/6		
Bihari	6	9	7	4/5		
Chirag	6	8	8	4/5		
Deepak	5	7/5	6/5	4/5		

In all the possible cases Bihari and Chirag have given rating more than 25 which means that Ravi got 20 bonus each for the delivery to Bihari and Chirag.

It is given that the bonus and tip was not received from the same customer which means that tip of 80 or 50 & 30 has been contributed by Atal and Deepak together.

Tip has been given by those who have not given the rating more than 25.

If we assume rating of Atal in Timeliness 9 than the total rating by Atal will exceed the sum of 25, So for Timeliness values 6, 5, 5, 5 will be taken.

If we assume the rating on Packaging by Atal is 7 than in Hygiene it would be 6 and in this condition the sum of rating by Atal will exceed 25. So, the rating given by Atal in Packaging and Hygiene will be 5 each.

	Behavior	Packaging	Hygiene	Timeliness	Sum	Tip/ Bonus
Atal	7	5	5	6	<25	50 Tip or 30 Tip
Bihari	6	9	7	5	>25	20 Bonus
Chirag	6	8	8	5	>25	20 Bonus
Deepak	5	7	6	5	<25	50 Tip or 30 Tip

11. Correct answer is [5].

As per the data given the table,
The minimum rating Ravi has received = 5

12. Option (1) is correct.

As per the data given the table,
Rating given by Atal, Bihari, Chirag and Deepak
are 23, 27, 27 & 23 respectively.
Highest rating is given by Bihari and Chirag.

13. Correct answer is [6].

As per the data given the table,
Rating by Atal on Timeliness = 6

14. Option (1) is correct.

Tip amount given by Deepak is either ₹50 or
₹30.

15. Option (4) is correct.

As per the data given the table,
Atal gave maximum rating to Ravi in Behaviour.

16. Option (4) is correct.

As per the data given the table,
Rating by Deepak on packaging = 7

Solution for Questions 17 to 20:

It can be observed that a person can play maximum four matches from any group.

A person can start playing matches either from match 1 or match 2.

Chitra played 3 matches and Chetan who is a group member of Chitra played 2 Matches. There can be 2 cases for this,

Case 1: If Chitra started from Match 1 than Chetan can play only 1 (First match only). This is negating the given statement So, this case cannot be taken.

Only possibility from where Chitra started is Match 2.

	Group A		Group B		Group C		Group D	
Match 1						Chetan		
Match 2					Chitra	Chetan		
Match 3 (Semi Final)					Chitra			
Match 4 (Final)					Chitra			

The same case is with Aruna and Azul.

	Group A		Group B		Group C		Group D	
Match 1		Azul				Chetan		
Match 2	Aruna	Azul			Chitra	Chetan		
Match 3 (Semi Final)	Aruna				Chitra			
Match 4 (Final)	Aruna				Chitra			

From the above table it can be observed that final is played between Aruna and Chitra, and Chitra lost in the final (Given in the question): It means that Aruna won in the final.

	Group A		Group B		Group C		Group D	
Match 1		Azul				Chetan		
Match 2	Aruna	Azul			Chitra	Chetan		
Match 3 (Semi Final)	Aruna				Chitra			
Match 4 (Final)	Aruna (Won)				Chitra (Lost)			

It is given that Dipen and Biju played 3 games each.

	Group A		Group B		Group C		Group D	
Match 1	Arif	Azul	Biju	Brinda/Brij	Chavi	Chetan	Dipen	Donna/ Deb
Match 2	Aruna	Azul	Biju	Brij/Brinda	Chitra	Chetan	Dipen	Donna/ Deb
Match 3 (Semi Final)	Aruna		Biju		Chitra		Dipen	
Match 4 (Final)	Aruna (Won)				Chitra (Lost)			

17. Option (1) is correct.

As per the data given the table,

Rank 1 will play directly from Match 2 but if anyone start playing from Match 1 than he is definitely not the Rank 1.

1. Dipen (started playing from Match 1)
2. Aruna (started playing from Match 2)
3. Chitra (started playing from Match 2)
4. Brij (either started from Match 1 or Match 2)

Only Dipen definitely played match 1. So, Dipen definitely cannot be ranked 1 in the group.

18. Option (4) is correct.

As per the data given the table,

It can be observed directly that only 1 pair Chitra and Dipen has played against each other.

19. Option (3) is correct.

As per the data given the table,

Winner of the championship was 'Aruna'.

20. Option (2) is correct.

As per the data given the table,

Matches played by Chitra were against = Chetan, Dipen, Aruna

From the given options Biju is only person against whom Chitra not played match at any stage.

Quantitative Aptitude (QA)

1. Option (4) is correct.

$$\begin{aligned} \text{Given: } & x^2 - xy - x = 22 & \dots(i) \\ & y^2 - xy + y = 34 & \dots(ii) \end{aligned}$$

Adding (i) and (ii),

$$\begin{aligned} & x^2 + y^2 - 2xy - x + y = 56 \\ \Rightarrow & (x - y)^2 - (x - y) = 56 & \dots(iii) \end{aligned}$$

Consider $x - y = a$

Thus, (iii) becomes $a^2 - a = 56$

$$\begin{aligned} \Rightarrow & a^2 - a - 56 = 0 \\ \Rightarrow & (a + 7)(a - 8) = 0 \\ \Rightarrow & a + 7 = 0 \text{ or } a - 8 = 0 \\ \Rightarrow & a = -7 \text{ or } a = 8 \end{aligned}$$

Hence, $x - y = 7$ or $x - y = 8$

But, it is given that $x > y$

So, the value of $x - y$ can't be negative.

Hence, $x - y = 8$

2. Correct answer is [10].

Given: Let the number of matches played by the player be x .

It is given that 10 more matches are to be played.

Thus, the total number of matches = $x + 10$

Case 1: If the player scores a total of one goal in the next 10 matches, his overall average = 0.15 goals per match

Let the number of goals scored in the x matches be y .

$$\begin{aligned} \text{Average goals} &= \frac{\text{Sum of all goals}}{\text{Total number of matches}} \\ 0.15 &= \frac{y+1}{x+10} & \dots(i) \end{aligned}$$

Case 2: If the player scores a total of two goals in the next 10 matches, his overall average = 0.2 goals per match

$$\text{Average goals} = \frac{\text{Sum of all goals}}{\text{Total number of matches}}$$

$$\begin{aligned} 0.2 &= \frac{y+2}{x+10} \\ \Rightarrow 0.2 &= \frac{y+1}{x+10} + \frac{1}{x+10} \\ \Rightarrow 0.2 &= 0.15 + \frac{1}{x+10} \quad [\text{from (i)}] \end{aligned}$$

$$\Rightarrow 0.05x = 0.5$$

$$\Rightarrow x = 10$$

Hence, the number of matches the player has played is 10.

3. Correct answer is [7].

Given: $2.25 \leq 2 + 2^{n+2} \leq 202$ (where ' n ' is an integer)

$$\Rightarrow 2 + 0.25 \leq 2 + 2^{n+2} \leq 2 + 200$$

$$\Rightarrow 0.25 \leq 2^{n+2} \leq 200$$

$$\Rightarrow 2^{-2} \leq 2^{n+2} \leq 2^{7.644}$$

Comparing the indices,

$$-2 \leq n + 2 \leq 7.644$$

$$-4 \leq n \leq 5.644$$

So, the possible values of an integer ' n ' satisfying the given inequality are $-4, -3, -2, -1, 0, 1, 2, 3, 4$, and 5 .

To get the number of integer values of $3 + 3^{n+1}$, 3^{n+1} must always be an integer.

3^{n+1} will be an integer when $n + 1 \geq 0$

$$\text{i.e., } n \geq -1$$

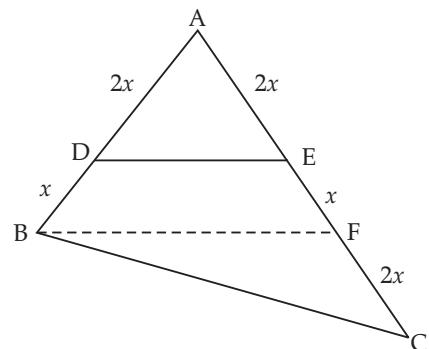
Thus, the possible values of ' n ' are $-1, 0, 1, 2, 3, 4$, and 5 .

Hence, the number of integer values is 7.

4. Correct answer is [30].

Given: In $\triangle ABC$, D and E are points on AB and AC, respectively.

$$\frac{AD}{BD} = \frac{2}{1} \text{ and } \frac{AE}{CE} = \frac{2}{3}$$



Area of $\triangle ADE = 8$ sq.cm.

Construction: Draw BF parallel to DE

Now, $\triangle ADE$ and $\triangle ABF$ are similar triangles

$$\therefore \frac{\text{Area}(\triangle ADE)}{\text{Area}(\triangle ABF)} = \frac{AD^2}{AB^2}$$

(Theorem of areas of similar triangles)

$$\Rightarrow \frac{8}{\text{Area}(\Delta ABF)} = \frac{2^2}{3^2} = \frac{4}{9}$$

$\Rightarrow \text{Area}(\Delta ABF) = 18 \text{ sq.cm.}$

We know that, the ratio of the areas of two triangles with equal heights is equal to the ratio of their corresponding bases.

ΔABF and ΔABC have equal height from vertex B

$$\therefore \frac{\text{Area}(\Delta ABF)}{\text{Area}(\Delta ABC)} = \frac{AF}{AC}$$

$$\Rightarrow \frac{18}{\text{Area}(\Delta ABC)} = \frac{3}{5}$$

$\Rightarrow \text{Area}(\Delta ABC) = 30 \text{ sq.cm.}$

5. Option (1) is correct.

Given: The rates of three different teas are ₹800, ₹500, and ₹300 per kg, respectively.

The ratio of three teas amounts purchased is $2 : 3 : 5$

Let the common factor be x .

Hence, three tea amounts purchased will be $2x$ kg, $3x$ kg and $5x$ kg, respectively.

$$\begin{aligned} \text{So, the total amount of tea} &= 2x + 3x + 5x \\ &= 10x \text{ kg.} \end{aligned}$$

$$\begin{aligned} \text{Hence, the total Cost Price (C.P.) of all the tea} \\ &= 800 \times 2x + 500 \times 3x + 300 \times 5x \\ &= ₹4600x \end{aligned}$$

$$\text{C.P. per kg} = \frac{4600x}{10x} = ₹460 \text{ per kg}$$

It is given that one-sixth of the tea mixture is sold at ₹700 per kg

So, in order to make an overall profit of 50%, let the remaining tea be sold at ₹ y per kg.

Thus, the equation becomes,

$$\frac{1}{6} \times 10x \times 700 + \frac{5}{6} \times 10x \times y = 1.5 \times \text{C.P. per kg} \times 10x$$

$$\Rightarrow \frac{1}{6} \times 10x \times 700 + \frac{5}{6} \times 10x \times y = 1.5 \times 460 \times 10x$$

$$\Rightarrow \frac{700 + 5y}{6} = 15 \times 46$$

$$\Rightarrow 140 + y = 18 \times 46$$

$$\Rightarrow y = 828 - 140$$

$$\Rightarrow y = 688$$

Hence, the remaining tea should be sold at the rate of ₹688 per kg.

6. Option (3) is correct.

$$\text{Given: } f(x) = \frac{x^2 + 2x + 4}{2x^2 + 4x + 9}$$

$$\Rightarrow 2 \cdot f(x) = \frac{2x^2 + 4x + 8}{2x^2 + 4x + 9}$$

$$\Rightarrow 2 \cdot f(x) = \frac{2x^2 + 4x + 9 - 1}{2x^2 + 4x + 9}$$

$$\Rightarrow 2 \cdot f(x) = 1 - \frac{1}{2x^2 + 4x + 9}$$

$$\Rightarrow f(x) = \frac{1}{2} - \frac{1}{4x^2 + 8x + 18}$$

For $4x^2 + 8x + 18$; $a = 4$, $b = 8$, and $c = 18$

$$\text{Minimum value of } 4x^2 + 8x + 18 = \frac{-(b^2 - 4ac)}{4a}$$

$$= \frac{-(8^2 - 4 \times 4 \times 18)}{4 \times 4}$$

$$= 14$$

Maximum value of $4x^2 + 8x + 18 = \infty$

$$\text{Hence, the minimum value of } f(x) = \frac{1}{2} - \frac{1}{14}$$

$$= \frac{6}{14}$$

$$= \frac{3}{7}$$

$$\text{Maximum value of } f(x) = \frac{1}{2} - \frac{1}{\infty}$$

$$= \frac{1}{2} - 0$$

$$= \frac{1}{2}$$

At infinity (∞), we always have an open bracket.

Hence, the value $\frac{1}{2}$ should be excluded from

the range of the function $f(x)$.

So, the range of the function $f(x)$ is

$$\frac{3}{7} \leq f(x) < \frac{1}{2}$$

$\frac{3}{7}$ will be included in and $\frac{1}{2}$ will be excluded

from the range of $f(x)$.

Since, the inclusion of a value is indicated by the square bracket and the exclusion of a value is indicated by the round bracket.

The range of the function $f(x)$ is $\left[\frac{3}{7}, \frac{1}{2} \right)$.

7. Correct answer is [1000].

Given: There are 15 identical balloons, 6 identical pencils, and 3 identical erasers.

These are required to be distributed among 3 children.

Condition: Each child must get at least four balloons and one pencil.

After distributing four balloons and one pencil to each of the three children,

We are left with three balloons, three pencils, and three erasers.

We know that the number of ways to distribute ' n ' identical things among ' r ' persons is ${}_{n+r-1}C_{r-1}$

Therefore, the number of ways in which the remaining three balloons, three pencils, and three erasers that can be distributed among three children = ${}^{3+3-1}C_{3-1} \times {}^{3+3-1}C_{3-1} \times {}^{3+3-1}C_{3-1}$

$$= {}^5C_2 \times {}^5C_2 \times {}^5C_2$$

$$= \frac{5 \times 4}{2} \times \frac{5 \times 4}{2} \times \frac{5 \times 4}{2}$$

$$= 10 \times 10 \times 10$$

$$= 1000 \text{ ways}$$

8. Option (4) is correct.

Given: Three positive integers x, y and z are in arithmetic progression (A.P.)

If the common difference between x and y or between y and z is ' d ',

$$\text{then } x = y - d \quad \dots(i)$$

$$\text{and } z = y + d \quad \dots(ii)$$

It is given that $x y z = 5(x + y + z)$

From (i) & (ii), $(y - d)y(y + d) = 5(y - d + y + y + d)$

$$\Rightarrow y(y - d)(y + d) = 5(3y)$$

$$\Rightarrow y(y - d)(y + d) = 15y$$

$$\Rightarrow x \cdot z = 15 \quad \{\text{from (i) and (ii)}\}$$

The possible values of x and z are

either $x = 3$ and $z = 5$

or $x = 1$ and $z = 15$

$$\text{For } x = 3 \text{ and } z = 5, y = \frac{x+z}{2}$$

$$\Rightarrow y = \frac{3+5}{2} = 4$$

(Since x, y and z are in A.P.)

$$\therefore y - x = 4 - 3 = 1$$

But, it is given that $(y - x) > 2$. So, $(y - x) \neq 1$

$$\text{For } x = 1 \text{ and } z = 15, y = \frac{1+15}{2} = 8$$

$$\therefore y - x = 8 - 1 = 7$$

$$\therefore (y - x) > 2$$

Hence, $x = 1, y = 8$ and $z = 15$

$$\therefore z - x = 15 - 1 \\ = 14$$

9. Correct answer is [5].

Given: $\log_2[3 + \log_3\{4 + \log_4(x-1)\}] - 2 = 0$

$$\Rightarrow \log_2[3 + \log_3\{4 + \log_4(x-1)\}] = 2 \times 1$$

$$\Rightarrow \log_2[3 + \log_3\{4 + \log_4(x-1)\}] = 2 \times \log_2 2 \\ (\because \log_a a = 1)$$

$$\Rightarrow \log_2[3 + \log_3\{4 + \log_4(x-1)\}] = \log_2 2^2 \\ (\because a \log m = \log m^a)$$

$$\Rightarrow 3 + \log_3\{4 + \log_4(x-1)\} = 4$$

$$\Rightarrow \log_3\{4 + \log_4(x-1)\} = 1$$

$$\Rightarrow \log_3\{4 + \log_4(x-1)\} = \log_3 3 \quad (\because \log_a a = 1)$$

$$\Rightarrow 4 + \log_4(x-1) = 3$$

$$\Rightarrow \log_4(x-1) = -1$$

$$\Rightarrow \log_4(x-1) = -\log_4 4 \quad (\because \log_a a = 1)$$

$$\Rightarrow \log_4(x-1) = \log_4(4)^{-1} \quad (\because a \log m = \log m^a)$$

$$\Rightarrow x - 1 = 4^{-1}$$

$$\Rightarrow x - 1 = \frac{1}{4}$$

$$\Rightarrow 4x - 4 = 1$$

$$\Rightarrow 4x = 4 + 1$$

$$\Rightarrow 4x = 5$$

10. Correct answer is [45].

Given: 9 litres of the milk is drawn twice from the container filled with milk and is replaced with water each time.

The present milk to water ratio is 16 : 9.

Let the capacity of the container be x liters.

The milk left in the container after two operations

$$= \left\{ x \left(\frac{x-9}{x} \right)^2 \right\} \text{ litres}$$

$$\therefore \left(\frac{16}{16+9} \right) \cdot x = \left\{ x \left(\frac{x-9}{x} \right)^2 \right\}$$

$$\Rightarrow \frac{16}{25} = \left(\frac{x-9}{x} \right)^2$$

Taking square root, we get

$$\Rightarrow \frac{4}{5} = \frac{x-9}{x}$$

$$\Rightarrow \frac{4}{5} = 1 - \frac{9}{x}$$

$$\Rightarrow \frac{9}{x} = \frac{1}{5}$$

$$\Rightarrow x = 45$$

Hence, the capacity of the container is 45 litres.

11. Option (1) is correct.

Given: Principal amount invested by Raj = ₹10,000

Overall gain or profit during the two years period = 35%

Let the loss during the first year be $x\%$.

So, the profit during the second year = $5x\%$

$$\text{Amount after two years} = 10,000 \times \frac{135}{100}$$

$$= ₹13,500$$

Amount after two years

$$= 10,000 \times \left(1 - \frac{x}{100}\right) \times \left(1 + \frac{5x}{100}\right)$$

$$13,500 = 10,000 \left(\frac{100-x}{100}\right) \left(\frac{100+5x}{100}\right)$$

$$\Rightarrow 13500 = 10000 + 400x - 5x^2$$

$$\Rightarrow 5x^2 - 400x + 3500 = 0$$

$$\Rightarrow x^2 - 80x + 700 = 0$$

$$\Rightarrow (x-70)(x-10) = 0$$

$$\Rightarrow x = 70 \text{ or } x = 10$$

If the loss during the first year is 70%, then the balance will be $10,000 - 7,000 = ₹3000$

But it is given that the balance was more than ₹5000.

Thus $x \neq 70$

If the loss during the first year is 10%, then the balance will be $10,000 - 1000 = ₹9000$

₹9000 is more than ₹5000.

Thus the condition is satisfied at $x = 10$

Hence, the percentage of loss in the first year is 10.

12. Option (4) is correct.

Given: $|3x-20| + |3x-40| = 20$

Dividing both sides by 3,

$$\left|x - \frac{20}{3}\right| + \left|x - \frac{40}{3}\right| = \frac{20}{3} \quad \dots(i)$$

Let's consider the above equation around the two values of x i.e., $\frac{20}{3}$ and $\frac{40}{3}$.

Considering $x < \frac{20}{3}$, (i) becomes,

$$-\left(x - \frac{20}{3}\right) - \left(x - \frac{40}{3}\right) = \frac{20}{3}$$

$$\Rightarrow -2x = \frac{-40}{3}$$

$$\Rightarrow x = \frac{20}{3}$$

Hence, $x \neq \frac{20}{3}$

Considering $\frac{20}{3} \leq x < \frac{40}{3}$, (i) becomes,

$$\left(x - \frac{20}{3}\right) - \left(x - \frac{40}{3}\right) = \frac{20}{3}$$

$$\Rightarrow \frac{20}{3} = \frac{20}{3}$$

Thus, satisfied

$$\text{Hence, } \frac{20}{3} \leq x < \frac{40}{3} \quad \dots(ii)$$

Considering $x \geq 40$, (i) becomes,

$$\left(x - \frac{20}{3}\right) + \left(x - \frac{40}{3}\right) = \frac{20}{3}$$

$$\Rightarrow 2x = \frac{80}{3}$$

$$\Rightarrow x = \frac{40}{3}$$

$$\text{Hence, } x \neq \frac{40}{3} \text{ but } x = \frac{40}{3} \quad \dots(iii)$$

From (ii) and (iii), the range of x is $\frac{20}{3} \leq x \leq \frac{40}{3}$

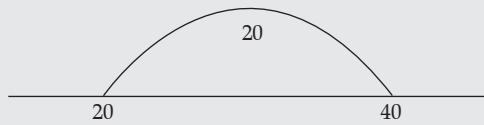
i.e., $6.66 \leq x \leq 13.33$.

Hence, $7 < x < 12$ is the correct answer.

Shortcut: Given $|3x - 20| + |3x - 40| = 20$

Let, $3x = y$

Then, $|y - 20| + |y - 40| = 20$



y to be between 20 and 40

Range $20 \leq y \leq 40$

$$\frac{20}{3} \leq x \leq \frac{40}{3}$$

$$6.67 \leq x \leq 13.33$$

$$7 \leq x < 12$$

13. Option (4) is correct.

Let pipe A fills an empty tank in x hours and pipe B empties the filled tank in y hours.

In Case I, the part of the tank filled by pipe A from 2 p.m. to 10 p.m. i.e., in 8 hours = $\frac{8}{x}$.

Also, the part of the tank emptied by pipe B from 3 p.m. to 10 p.m. i.e., in 7 hours = $\frac{7}{y}$.

The tank fill completely from 2 p.m. to 10 p.m.

$$\therefore \frac{8}{x} - \frac{7}{y} = 1 \quad \dots(i)$$

In Case II, the part of the tank filled by pipe A from 2 p.m. to 6 p.m. i.e., in 4 hours = $\frac{4}{x}$.

Also, the part of the tank emptied by pipe B from 4 p.m. to 6 p.m. i.e., in 2 hours = $\frac{2}{y}$.

The tank fills completely from 2 p.m. to 6 p.m.

$$\therefore \frac{4}{x} - \frac{2}{y} = 1 \quad \dots(ii)$$

$$\text{From (i) and (ii), } \frac{8}{x} - \frac{7}{y} = \frac{4}{x} - \frac{2}{y}$$

$$\Rightarrow \frac{8}{x} - \frac{4}{x} = \frac{7}{y} - \frac{2}{y}$$

$$\Rightarrow \frac{4}{x} = \frac{5}{y}$$

$$\Rightarrow y = \frac{5x}{4}$$

Substituting $y = \frac{5x}{4}$ in (i),

$$\frac{8}{x} - \frac{7}{\frac{5x}{4}} = 1$$

$$\Rightarrow \frac{8}{x} - \frac{28}{5x} = 1$$

$$\Rightarrow \frac{40 - 28}{5x} = 1$$

$$\Rightarrow 5x = 12$$

$$\Rightarrow x = \frac{12}{5} \text{ hours}$$

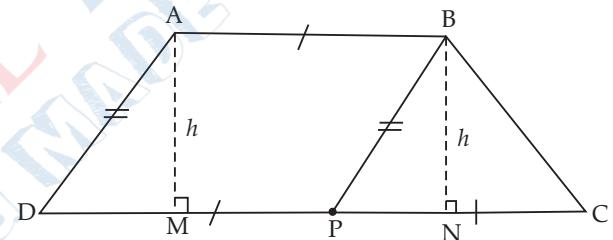
$$= \frac{12}{5} \times 60 \text{ hours}$$

$$= 144 \text{ minutes}$$

Hence, the time taken by pipe A to fill an empty tank is 144 minutes.

14. Option (2) is correct.

Given:



$\square ABCD$ is a trapezium

$$AB \parallel DC$$

P is the midpoint of DC $\Rightarrow DP = PC \quad \dots(i)$

$\square ABPD$ is a parallelogram

Area ($\square ABPD$) - Area ($\triangle BPC$) = 10 (given)

$$DP \times AM - \frac{1}{2} \times PC \times BN = 10$$

$$\Rightarrow DP \times AM - \frac{1}{2} \times DP \times AM = 10$$

{ $AB \parallel DC, AM=BN$ }

$$\Rightarrow \frac{DP \times AM}{2} = 10$$

$$\Rightarrow DP \times AM = 20 \quad \dots(ii)$$

Area (trapezium ABCD) = Area (parallelogram ABPD) + Area (triangle BPC)

$$= DP \times AM + \frac{1}{2} \times PC \times BN$$

$$= DP \times AM + \frac{1}{2} \times DP \times AM$$

$$\begin{aligned}
 &= \frac{3}{2} \times DP \times AM \\
 &= \frac{3}{2} \times 20 && \dots\{\text{from (ii)}\} \\
 &= 30 \text{ sq.cm.}
 \end{aligned}$$

15. Option (4) is correct.

Given: The ratio of the speeds of two trains A and B = 5 : 3

Let the common factor be x .

Therefore, the speeds of train A and train B will be $5x$ and $3x$ respectively.

It is given that the two trains are moving in opposite directions towards each other.

Hence, the relative speed will be $8x$

[Concept: When two bodies are moving in opposite direction towards each other, their speeds gets added].

Let the lengths of train A and train B be l_A and l_B , respectively.

During the first 46 seconds, train A travels a distance of l_B .

$$\text{Now, } \text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

$$\therefore 8x = \frac{l_B}{46} \quad \dots(\text{i})$$

During the next 69 seconds, train A travels a distance of l_A .

$$\therefore 8x = \frac{l_A}{69} \quad \dots(\text{ii})$$

$$\text{From (i) and (ii), } \frac{l_A}{69} = \frac{l_B}{46}$$

$$\Rightarrow \frac{l_A}{l_B} = \frac{69}{46}$$

$$\Rightarrow \frac{l_A}{l_B} = \frac{3}{2}$$

Hence, the ratio of length of train A to that of train B is 3 : 2

16. Correct answer is [250].

Given: The total number of ball in the box = 450
Balls are either white or black.

Let the number of the white balls be x .

So, the number of the black balls = $(450 - x)$

It is given that 40% of the white balls and 50% of the black balls are metallic.

Also, the number of metallic white balls = the number of metallic black balls (given)

$$\therefore 40\% \text{ of } x = 50\% \text{ of } (450 - x)$$

$$\Rightarrow \frac{40}{100} \times x = \frac{50}{100} \times (450 - x)$$

$$\Rightarrow 4x + 5x = 450 \times 5$$

$$\Rightarrow 9x = 2250$$

$$\Rightarrow x = 250$$

Hence, there are 250 white balls

The number of metallic white balls = 40% of 250

$$\begin{aligned}
 &= \frac{40}{100} \times 250 \\
 &= 100
 \end{aligned}$$

\therefore The number of metallic black balls = 100

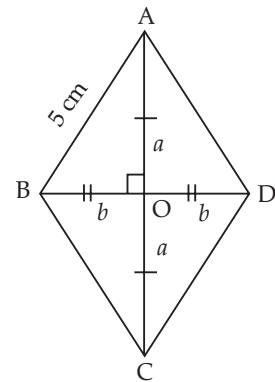
$$\begin{aligned}
 \text{Total number of metallic balls} &= 100 + 100 \\
 &= 200
 \end{aligned}$$

Hence, the number of non-metallic balls in the box

$$\begin{aligned}
 &= 450 - 200 \\
 &= 250
 \end{aligned}$$

17. Option (2) is correct.

Given:



Area (rhombus ABCD) = 12 sq. cm.

Side AB = 5 cm

Let the longer and the shorter diagonal of the rhombus ABCD be denoted by $2a$ and $2b$, respectively

We know that the diagonals of a rhombus bisect each other at the right angle. Hence, $\angle AOB = 90^\circ$

$$\text{Area (rhombus ABCD)} = \frac{1}{2} \times 2a \times 2b$$

$$\Rightarrow 12 = 2ab$$

$$\Rightarrow 2ab = 12 \quad \dots(\text{i})$$

Applying Pythagoras theorem to right-angled triangle AOB,

$$\begin{aligned} (AO)^2 + (BO)^2 &= (AB)^2 \\ \Rightarrow a^2 + b^2 &= 5^2 \\ \Rightarrow a^2 + b^2 &= 25 \end{aligned} \quad \dots \text{(ii)}$$

Adding '2ab' to both sides in (ii),

$$\begin{aligned} a^2 + b^2 + 2ab &= 25 + 2ab \\ \Rightarrow (a+b)^2 &= 25 + 12 \quad \{ \text{from (i)} \} \\ &= 37 \end{aligned}$$

$$\Rightarrow a+b = \sqrt{37} \quad \dots \text{(iii)}$$

Subtracting '2ab' from both sides in (ii),

$$\begin{aligned} a^2 + b^2 - 2ab &= 25 - 2ab \\ \Rightarrow (a-b)^2 &= 25 - 12 \quad \{ \text{from (i)} \} \\ &= 13 \end{aligned}$$

$$\Rightarrow a-b = \sqrt{13} \quad \dots \text{(iv)}$$

Adding (iii) and (iv).

$$2a = \sqrt{37} + \sqrt{13}$$

Hence, the length of the longer diagonal of the given rhombus is $\sqrt{37} + \sqrt{13}$.

18. Correct answer is [4195].

Let the required four-digit number be $p q r s$

$$\text{It is given that } p+q+r=14 \quad \dots \text{(i)}$$

$$p+r+s=15 \quad \dots \text{(ii)}$$

$$\Rightarrow r=s+4$$

$$\Rightarrow s=r-4 \quad \dots \text{(iii)}$$

Subtracting (i) from (ii), we get

$$s-p=1$$

$$\Rightarrow p=s-1$$

$$\Rightarrow p=(r-4)-1 \quad \{ \text{from (iii)} \}$$

$$\Rightarrow p=r-5 \quad \dots \text{(iv)}$$

To get the highest possible four-digit number, the value of 'p' must be as maximum as possible. But the maximum values of 'p' cannot go beyond 4 becomes at $p=5$, 'r' becomes a two-digit number. (i.e., 10).

$$\text{Hence, } p=4$$

$$\text{From (iv), } 4=r-5$$

$$\Rightarrow r=9$$

$$\text{From (iii), } s=9-4$$

$$\Rightarrow s=5$$

$$\text{From (i), } 4+q+9=14$$

$$\Rightarrow q=1$$

Hence, the required four-digit number is 4195.

19. Option (1) is correct.

$$\begin{aligned} \text{Given: } x_1 - x_2 + x_3 - \dots + (-1)^{n+1} x_n \\ = n^2 + 2n \end{aligned} \quad \dots \text{(i)}$$

For $n=48$, (i) becomes,

$$x_1 - x_2 + x_3 - \dots + x_{47} - x_{48} = (48)^2 + 2 \times 48 \dots \text{(ii)}$$

For $n=49$, (i) becomes,

$$x_1 - x_2 + x_3 - \dots - x_{48} + x_{49} = (49)^2 + 2 \times 49 \dots \text{(iii)}$$

For $n=50$, (i) becomes,

$$x_1 - x_2 + x_3 - \dots + x_{49} - x_{50} = (50)^2 + 2 \times 50 \dots \text{(iv)}$$

Subtracting (ii) from (iii), we get

$$\begin{aligned} x_{49} &= (49)^2 - (48)^2 + 2(49-48) \\ &= 97 + 2 = 99 \end{aligned}$$

Subtracting (iv) from (iii), we get

$$\begin{aligned} x_{50} &= (49)^2 - (50)^2 + 2(49-50) \\ &= -99 - 2 \\ &= -101 \end{aligned}$$

$$\text{Hence, } x_{49} + x_{50} = 99 + (-101) = -2$$

20. Option (1) is correct.

Given: Anil and Bimal can point a house in 60 days and 84 days, respectively.

Let Charu point a house in x days.

Work done by Anil during the initial 10 days

$$\begin{aligned} &= \frac{1}{60} \times 10 \\ &= \frac{1}{6} \end{aligned}$$

$$\text{So, the remaining work} = 1 - \frac{1}{6}$$

$$= \frac{5}{6}$$

Thus, $\frac{5}{6}$ of the work is done by Anil, Bimal, and Charu together in the next 14 days.

$$\left(\frac{1}{60} + \frac{1}{84} + \frac{1}{x} \right) \times 14 = \frac{5}{6}$$

$$\Rightarrow \frac{12x + 420}{5x} = \frac{5}{1}$$

$$\Rightarrow 13x = 420$$

$$\Rightarrow x = \frac{420}{13}$$

Thus, Charu can point a house in $\frac{420}{13}$ days.

Therefore, in 14 days, work done by Charu

$$\begin{aligned} &= \frac{13}{420} \times 14 \\ &= \frac{13}{30} \end{aligned}$$

Hence, the share of Charu, proportionate to the work done by him, is ₹ $\left(\frac{13}{30} \times 21000\right)$ i.e., ₹ 9100.

21. Option (4) is correct.

Given: The share of Anil, Bobby and Chintu in the total profit is in proportion to their investments.

Anil's share of investment = 70% (given)

So, Anil's share of profit = 70%

It is given that Anil's share of profit decreases by ₹ 420 if the overall profit goes down from 18% to 15%.

It means that 3% decrease in Anil's profit equals ₹ 420.

But the profit is calculated with respect to investment.

∴ 3% of Anil's investment = 420

$$\Rightarrow \frac{3}{100} \times \text{Anil's investment} = 420$$

$$\Rightarrow \text{Anil's investment} = ₹ 14,000$$

Anil's investment = 70% of Total investment

$$\Rightarrow 14000 = \frac{70}{100} \times \text{Total investment.}$$

$$\Rightarrow \text{Total investment} = ₹ 20,000$$

Also, Chintu's share of profit increases by ₹ 80 if the overall profit goes up from 15% to 17%

It means that 2% increase in Chintu's profit equals ₹ 80.

∴ 2% of Chintu's investment = 80

$$\Rightarrow \frac{2}{100} \times \text{Chintu's investment} = 80$$

$$\Rightarrow \text{Chintu's investment} = ₹ 4000$$

Bobby's investment = Total investment

– Anil's investment

– Chintu's investment

$$\begin{aligned} &= 20000 - 14000 - 4000 \\ &= ₹ 2,000 \end{aligned}$$

Hence, the amount invested by Bobby is ₹ 2,000.

22. Option (4) is correct.

Given: $ax^2 - bx + c = 0$, where a , b , and c are rational numbers and $a \neq 0$

$2 + \sqrt{3}$ is one of the roots of the given equation
Hence, the other root should be conjugate of $2 + \sqrt{3}$

Thus, the other root is $2 - \sqrt{3}$

$$\text{Sum of the roots} = -\frac{(-b)}{a}$$

$$\Rightarrow (2 + \sqrt{3}) + (2 - \sqrt{3}) = \frac{b}{a}$$

$$\Rightarrow 4 = \frac{b}{a}$$

$$\Rightarrow b = 4a \quad \dots(i)$$

$$\text{Product of the roots} = \frac{c}{a}$$

$$\Rightarrow (2 + \sqrt{3}) \times (2 - \sqrt{3}) = \frac{c}{a}$$

$$\Rightarrow 1 = \frac{c}{a}$$

$$\Rightarrow c = a \quad \dots(ii)$$

$$b = c^3 \quad (\text{given})$$

$$\Rightarrow 4a = a^3 \quad \{\text{from (i) and (ii)}\}$$

$$\Rightarrow 4 = a^2 \quad (\because a \neq 0)$$

$$\Rightarrow a = \pm 2$$

$$\Rightarrow |a| = |\pm 2|$$

$$\Rightarrow |a| = 2$$